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10/520,696	10/19/2005	Francisco Jose Munoz Perez	U 015575-8	9657
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/520,696

Applicant(s)MUNOZ PEREZ, FRANCISCO
JOSE**Examiner**

BRENT PAGE

Art Unit

1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-52 and 75-86 is/are pending in the application.
- 4a) Of the above claim(s) 37-52 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 75 and 77-85 is/are rejected.
- 7) ☒ Claim(s) 76 and 86 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 January 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/2005
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group II, claims 62-74 in the reply filed on 11/10/2008 is acknowledged. The traversal is on the ground(s) that the NPPase of the current invention is completely different from the protein disclosed by Goldfine et al. This is not found persuasive because Applicant's claims encompassed multiple NPPases, and therefore the technical feature linking these inventions is the enzyme, which is a nucleotide pyrophosphatase, and enzyme disclosed in the prior art and by Goldfine et al (US Patent 5968508). The claims are not limited to NPPases from plant sources, for example, claim 75 claims an expression vector comprising a cDNA sequence that encodes for "an" enzyme having NPPase activity. This claim encompasses all NPPases, regardless of origin, therefore the restriction requirement stands.

The requirement is still deemed proper and is therefore made FINAL.

Claims 37-52 are withdrawn as being drawn to nonelected subject matter.

Claims 75-86 are examined on the merits herein.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: There are sequences in figure 4 with no reference to SEQ ID NOs in either the figure of the Brief Description of the Drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the

reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Applicant is advised that should claim 83 be found allowable, claim 84 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112-New Matter

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 75, 77-80 and 85 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 75, 78 and 85 all recite "NPPase activity" wherein the scope of the claims encompasses all NPPases from any source. There is no support in the specification for the breadth of the claims, there is no support in the original claim set for this breadth. Accordingly the claims are directed to New Matter.

Claims 77 and 79 depend from claims directed to new matter and therefore contain the same limitations and are also directed to New Matter.

The claims must be amended to remove New Matter from the claims.

Claim Rejections - 35 USC § 112-enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 75, 77-80 and 85 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the transformation of plants with SEQ ID NO:20 resulting in a transgenic plant having a reduced amount of starch, does not reasonably provide enablement for using any NPPase from any source or for any sequence encoding an enzyme having NPPase activity. The specification does not

enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The claims are drawn to any NPPase from any source for transforming a plant to reduce starch in the plant.

In contrast the specification only provides guidance for the transformation of SEQ ID NO:20 into plants wherein the starch content is reduced. The specification does not provide guidance for any other NPPases and transforming plants nor does the specification provide guidance as to what sequence motifs should be retained in functioning embodiments. Regarding the amplification of the cDNA with primers SEQ ID NO:18 and SEQ ID NO:19, it is unclear whether the primers are in conserved regions of the NPPase across species and would therefore amplify multiple NPPases or not. Without that guidance, it is considered that cDNAs amplified from these primers may come from multiple sources, and as such, while further limiting, still would encompass multiple embodiments with no guidance as to which embodiments would be functional.

NPPases are a large family of proteins with very diverse functions and determining function from structure is unpredictable. In a study where a plant nucleotide pyrophosphatase was purified, Moorhead et al (2003 Eur. J. Biochem. 270:1356-1362) disclose that "Nucleotide pyrophosphatases belong to a family of widely distributed hydrolases that are active on a variety of derivatives of nucleoside diphosphates" (see page 1360 2nd to last paragraph) and "The nonspecific hydrolysis by nucleotide pyrophosphatases has previously caused confusion in regulatory systems that use ATP and adenine dinucleotides" (see page 1361, 2nd full paragraph). Both the

nonspecific action and the remaining elucidation of the many NPPases from all sources render unpredictable what effect such NPPases may have on starch content in plants, particularly wherein the NPPase is from a source other than plants, but also wherein the function of the enzyme is broadly characterized by the larger family activity which renders unpredictable what phenotype other members of the family would create when transformed into plants.

Given the state of the art and the disclosure by Moorhead et al, it would have been undue experimentation for one of skill in the art to isolate and evaluate all NPPases from all sources and test them for their ability to alter starch content in plants as broadly claimed.

Claim Rejections - 35 USC § 112-written description

Claims 75, 77-80 and 85 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to any NPPase from any source for transforming a plant to reduce starch in the plant, which encompasses multitudes of sequences.

In contrast the specification only describes SEQ ID NO:20 and SEQ ID NO:22 with the function of NPPases. The specification does not describe any other sequences encoding NPPases. Furthermore, the specification does not describe what structural features are necessary for the claimed function. The specification does not describe

what is required for a sequence to be considered encoding NPPase, nor does the specification describe what is required for the claimed sequence to lower starch content as broadly claimed. Regarding the amplification of the cDNA with primers SEQ ID NO:18 and SEQ ID NO:19, it is unclear whether the primers are in conserved regions of the NPPase across species and would therefore amplify multiple NPPases or not. Without description of these embodiments or at least description of required sequence motifs, it is considered that cDNAs amplified from these primers may come from multiple sources, and as such, while further limiting, still would encompass multiple embodiments that have not been described in the specification.

The Federal Circuit has recently clarified the application of the written description requirement. The court stated that a written description of an invention "requires a precise definition, such as by structure, formula, [or] chemical name, of the claimed subject matter sufficient to distinguish it from other materials." *University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 1568; 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). The court also concluded that "naming a type of material generally known to exist, in the absence of knowledge as to what that material consists of, is not a description of that material." *Id.* Further, the court held that to adequately describe a claimed genus, Patent Owner must describe a representative number of the species of the claimed genus, and that one of skill in the art should be able to "visualize or recognize the identity of the members of the genus." *Id.*

Finally, the court held:

A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus. *Id.*

See also MPEP section 2163, page 174 of chapter 2100 of the August 2005 version, column 1, bottom paragraph, where it is taught that

[T]he claimed invention as a whole may not be adequately described where an invention is described solely in terms of a method of its making coupled with its function and there is no described or art-recognized correlation or relationship between the structure of the invention and its function. A biomolecule sequence described only by a functional characteristic, without any known or disclosed correlation between that function and the structure of the sequence, normally is not a sufficient identifying characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence.

See also *Amgen Inc. v. Chugai Pharmaceutical Co. Ltd.*, 18 USPQ 2d 1016 at 1021, (Fed. Cir. 1991) where it is taught that a gene (which includes a promoter) is not reduced to practice until the inventor can define it by "its physical or chemical properties" (e.g. a DNA sequence).

Given the claim breadth and lack of description as discussed above, the specification fails to provide an adequate written description of the genus of sequences as broadly claimed. Given the lack of written description of the claimed genus of sequences, any method of using them, such as transforming plant cells and plants therewith, and the resultant products including the claimed transformed plant cells and plants containing the genus of sequences, would also be inadequately described. Accordingly, one skilled in the art would not have recognized Applicant to have been in possession of the claimed invention at the time of filing. See the Written Description

Requirement guidelines published in Federal Register/ Vol. 66, No. 4/ Friday January 5, 2001/ Notices: pp. 1099-1111.

Claim Rejections - 35 USC § 112-2nd paragraph indefiniteness

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 81-82 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims both recite "Primer of SEQ ID NO:". It is unclear whether the claim is indicating a primer of SEQ ID NO:18 or 19 which may be flanking sequences to SEQ ID NO:18 wherein the primer amplifies SEQ ID NO:18 or 19, any primer of SEQ ID NO:18 or 19 which may be any primer of any length over any part of SEQ ID NO:18 or 19 or the primer that is SEQ ID NO:18 or 19. For purposes of examination, it is considered to mean any primer of any length over any part of SEQ ID NO:18 and SEQ ID NO:19.

To obviate this rejection Applicant must amend the claims to more clearly point out the invention. For example, if Applicant intended the primer to be only SEQ ID NO:18, the claim would read ---The--- primer ---shown in--- [of] SEQ ID NO: 18. New Matter must be avoided.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 83-84 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are broadly drawn to cDNA. There is no mention of isolation and because NPPase may be from any source including bacterial sources that lack introns, the cDNA would be indistinguishable from that potentially found in nature. Accordingly, the claims are drawn to a product of nature, which is non-statutory subject matter.

See *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), *Funk Bros. Seed Co. V. Kalo inoculant Co.*, 233 U.S. 127 (1948), and *American Fruit Growers v. Brogdex Co.*, 283 U.S. 2 (1931).

This rejection can be overcome by amendment of claims 83-84 to indicate that the cDNA is isolated.

New Matter should be avoided.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 75, 78-80 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene et al (WO9907841) in view of Bridges et al (US Patent 5792920).

The claims are drawn to a method for producing a transgenic plant reduced in starch comprising transforming a plant with a nucleic acid encoding an enzyme having NPPase activity, transforming the plant via *Agrobacterium tumefaciens*, wherein the plant is a tobacco, potato or tomato plant and the transgenic plant therefrom.

Greene et al teach transforming plants with ADP-glucose pyrophosphatase, an enzyme with NPPase activity (see claims, for example) using *Agrobacterium tumefaciens* (see Example 6), wherein the plant is potato or tomato (see page 46 2nd paragraph) and the transgenic plant therefrom (see Example 6).

Greene et al does not teach a plant reduced in starch, although Greene et al does teach the relationship between starch content and transgenic plants with ADP-glucose pyrophosphatase (see claim 20 in particular).

Bridges et al teach the production of transgenic plants tomato and potato (see claims 1-5) with decreased starch content (see paragraph 26 under summary of invention) using antisense constructs wherein the gene is ADP-glucose pyrophosphorylase (see background and examples).

Given the state of the art and the disclosures by Greene et al and Bridges et al, it would have been obvious to one of ordinary skill in the art to decrease the starch content using the gene taught by Greene et al, as taught by Bridges et al by constructing anti-sense constructs. The strain of *Agrobacterium* used in the

transformation is a design choice that would have readily been obvious to one ordinary skill in the art. Absent evidence to the contrary, the strain of *Agrobacterium* does not impact the success of the instantly claimed invention and is considered a design choice available to anyone of ordinary skill in the art. One of ordinary skill in the art would have had a reasonable expectation of success in decreasing starch content given the correlation of starch content with the overexpression of ADP-glucose pyrophosphatase as taught by Greene et al and applying antisense technology as taught by Bridges et al. Bridges et al provide both a demonstration and motivation to reduce starch content by teaching the reduction of starch content using antisense constructs to ADP-glucose pyrophosphorylase, a gene that is highly similar to ADP-glucose pyrophosphatase. Given the results achieved by Bridges et al one of ordinary skill in the art would have had reason to believe that antisense constructs using ADP-glucose pyrophosphatase would have also led to a reduced starch content.

Claims 76-77, 81-84 and 86 appear to be free of the prior art given the failure of the prior art to teach or reasonably suggest SEQ ID NO:18 or SEQ ID NO:19 as a primer and SEQ ID NO:20.

Claims 76 and 86 are objected to for depending from rejected claims but would be allowable if rewritten in independent form.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRENT PAGE whose telephone number is (571)272-5914. The examiner can normally be reached on Monday-Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571)-272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brent T Page

/Russell Kallis/
Primary Examiner, Art Unit 1638